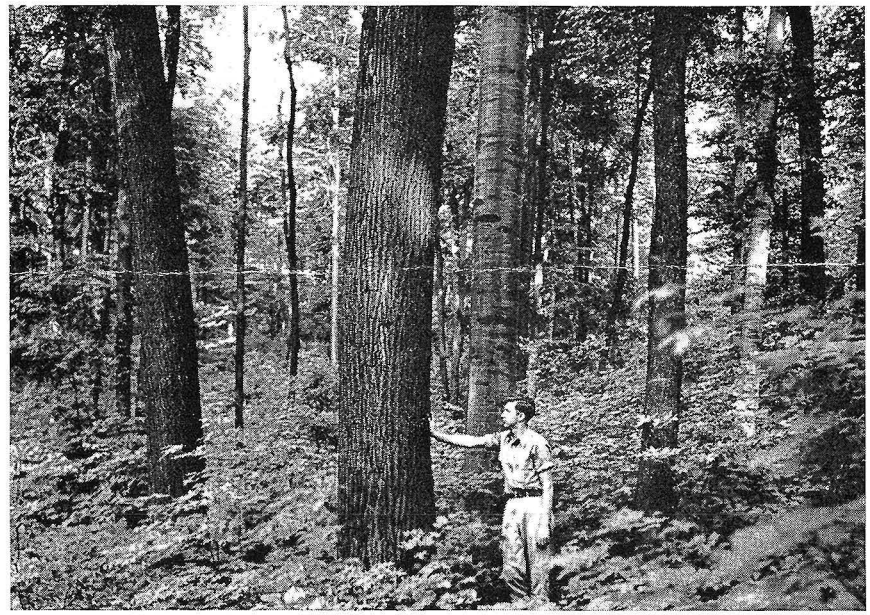
FORESTRY DAY

OCTOBER 7, 1954



Ohio Agricultural Experiment Station
Wooster, Ohio

Forestry Mimeograph Series No. 16

THE TOUR

Station I

Plot D-13. WHITE PINE AND AMERICAN CHESTNUT - Planted in spring, 1909

This alternate row mixture of white pine and American chestnut was planted 45 years ago in a 6 x 6 foot spacing. According to the records, 15 dead or diseased chestnuts were grubbed and burned in 1922. At that time the blight was referred to as "the chestnut bark disease". Only 50 years ago the chestnut blight native to the Orient struck its first tree in the New York Zoological Park. Its quick spread throughout the East brought about a plant disaster with few parallels. Now American scientists are bringing in from the Orient trees that are largely immune, or resistant to the chestnut blight.

A new planting of white pine and timber type Chinese chestnut was established in October, 1954 immediately to the north of the original white pine-American chestnut plot. This planting was dedicated on October 6, 1954 as a tribute to all foresters who have contributed to the forestry program at the Statinn since 1904.

The spacing was 8 x 8 feet and the planting pattern is indicated below:

xxooxxooxxoo
xxooxxooxxoo
ooxxooxxooxx
ooxxooxxooxx

x -- white pine
o -- timber type Chinese chestnut

Plot D-11. REDCEDAR - Planted in 1911

Six-year transplants obtained from the D.Hill Nursery, Dundee, Illinois in 1911 were planted 6 x 6 feet. This plot was seriously damaged by ice and snow during the winter of 1953-54. Consequently, the plot was clear cut in the spring of 1954. The posts are piled on the west side of the road near the plot.

At age 43 this 100 x 100 foot plot yielded 228 posts with the following size distribution:

	No.	Top Diameter (Inches)	Length (Feet)	Value (Dollars)
	9	2 - 2.5	7	0.90
	5	3 - 3.5	7	1.50
	4	4 +	7	1.60
	30	2 - 2.5	8½	4.50
	79	3 - 3.5	8½	31.60
	101	4 +	8½	50.50
Total	228			$90.60

or $407.70 per acre.

Redcedar is a durable wood and is in the same class as black locust when in contact with the soil, but the more rapid growth rate of the locust makes it a more profitable species for post production.

Station II

H-2. WOOD UTILIZATION

This area is being developed as the wood utilization center of the Station. Up to this time wood utilization research has been mostly in the field of post and pole preservation.

The chief preservative used has been copper naphthenate in 2%, 1%, and ½% concentrations, using various time periods of cold soaking and a number of species of both hard and soft woods.

A post treating project was started in 1944 to compare methods of treating, preservatives, and treatability of various species. Creosote and copper naphthenate were compared by using them with pressure, hot-cold bath, and 15-second cold dip treatments. Posts of American elm, soft maple, and southern pine were treated and set two feet in the ground.

The results to date show that untreated posts of these species will last only 3 - 4 years and that butt treatment is not sufficient. The cold soak method is a simple, inexpensive treatment that can be used with satisfactory results on the farm for many of the non-durable species.

Following are some observations and results from recent tests:

(1) A 6-hour cold soak gives adequate treatment for well seasoned pines. American elm was the only hardwood in this group showing indications of a satisfactory treatment.

(2) Posts should be well seasoned before treating.

(3) Depth of penetration is more important than the amount of material absorbed. A band of treated wood one-half to three-quarters of an inch in thickness is safe.

(4) A 0.5 percent (copper metal) solution of copper naphthenate can be prepared by mixing one gallon of 8 percent concentrate with 19 gallons of fuel oil or kerosene. One supplier recently quoted 8 percent copper metal concentrate at $2 per gallon in 450-pound drums (approximately 53 gallons). Mixing with 19 gallons of fuel oil at 15 cents per gallon produces a solution which costs about 25 cents per gallon or 3.1 cents per pound.

So, a 4-inch post taking up 3½ pounds of preservative will absorb about 11 cents worth of material. It is obvious that a small post is more economical to treat than a large one.

Unfortunately, there is a wide difference in the amount of preservative that different kinds of wood will take up. The pines, red oaks, elm, gum, hickory, sycamore, and cherry can be treated by cold soaking. Cottonwood, ash, ironwood, yellow poplar and maple do not take up enough of the preservative to give adequate protection.

In the case of poles for pole barn construction, if you do not have naturally durable poles such as locust it may be wiser to buy pressure treated poles or have them custom treated at the nearest wood preserving plant.

CHEMICAL DEBARKING

Experimentation in Canada, primarily by the Forest Products Laboratory and in the United States by the wood producing industry has in the past decade shown the practical possibilities of using chemicals for the debarking of standing timber. Most recently, extensive research in this field was reported on by a research team at Syracuse University. They reported after controlled research, the practical aspects of chemical debarking, and its use with a greater number of species than had been investigated before. The most effective chemical was shown to be a 40% sodium arsenite compound. This is a potent poison, but their studies indicate that it disappears in 24 - 72 hours from the face of the girdle to which it is applied, thus minimizing the dangers of prolonged accessibility to wildlife.

Here in the Arboretum during the past year this same chemical proved itself as an effective bark loosening agent in a study of 32 species involving 750 trees which were marked to be removed as a general thinning operation.

The sodium arsenite was applied to a bark girdle surface of standing trees of pole size during June in the sap peeling season to promote effective separation of bark for economical year-around "peeling".

Of the species tested, only white ash and douglasfir, and to a limited extent, wild black cherry proved unreceptive to this treatment in promoting rapid debarking. It was seen that on broad-leaved species the debarking action progressed only slowly below the girdle suggesting the importance of placing the girdle as low as possible.

In the Secrest Arboretum sodium arsenite served as an effective agent for promoting peelability during the fall and winter months with the following species: Norway spruce, European larch, eastern hemlock, redcedar, and white pine among the conifers, and tuliptree, cucumber tree, buckeye, sweetgum, basswood, black walnut, American elm, red elm, rock elm, the oaks including burr, shingle, white, red, scarlet, pin, and swamp white, hard maple, soft maple, oriental plane, American beech, river birch, honey locust, hackberry, sassafras, catalpa, and osageorange.

The pulpwood industries are particularly interested in this because it makes it possible to harvest pulpwood the year around and it results in the bark being left in the woods where it will not interfere with paper-making processes.

The secret of success of the chemical treatment during the "sap-peeling" season is based on the fact that the chemical moves upward in the outer layers of the sapwood where it kills the tissues and as the dead cells shrink the bark loosens. Since the chemical does not move downward, it is important to girdle the trees as low as possible.

Station III

H-3. GENETIC IMPROVEMENT OF SUGAR MAPLE

In 1953 a long term genetics research project on sugar maple was begun as the initial phase of a tree-breeding program. This is directed toward development of more productive sugar trees, through selection and controlled pollination of superior trees. Another aspect will be development of better strains for timber production.

Since we know nothing concerning the genotypes of sugar maple, a racial study was started, using seed and seedlings from many different geographic sources. The technique used involves keeping the sources distinct while growing the trees under acceptably uniform environmental conditions by statistically randomizing the plots. In addition, trees originating in the same environment are planted in different localities. By this method, the effects of environment are controlled and precise information is available on the amount of non-environmental (genetic) variation. In this experiment, controlled comparisons have been made from the very beginning and will continue after the trees are outplanted.

Results to date. At the end of one rather severe growing season, differences have been noted among the small seedlings in their ability to withstand heat and drought. There are good indications that seedlings from localities with high summer temperatures are more resistant to death from these causes than those from cooler regions. Among the larger trees in the plantation, a progression of bud-breaking and foliage development was noted, from the northern to the southern sources. Some differences in time of coloration and leaf fall will probably be noted this month, although dry weather has caused premature dormancy and leaf fall which may obscure this. Besides its relation to temperature, the time of leafing of sugar maple also appears to be correlated with latitude (i.e., photoperiod or summer day-length) of source locality.

Differences in cold resistance will be observed for the first time this coming winter. The trees are still too small to show much variation in growth rate. Some initial tests of sugar content will be made on the larger trees this winter, for comparative information. Other factors such as tree form, leaf color, and type of root system will be compared. Chromosome counts are planned, and possibly also chromatographic analyses of sugars.

Application.

(1) Information on survival and growth of seedlings and older trees will lead to recommendations as to the best sources of sugar maple seed for planting in a given locality. It is probable that we should pay more attention to this in our farm planting and reforestation, and use only trees certified as to source. There is, however, no point in certifying seed source until we have some information on its importance and what source to use.

(2) Knowledge of the extremes of genetic variation and where to obtain them will make it possible to combine by controlled pollination two or more desirable features, such as high sugar yield an rapid growth. Pollen can be sent anywhere by air mail, making it possible to use trees from any seed source as the male parent in crossing with selected local trees.

(3) Correlations between juvenile characters and those of the mature parent trees will be possible, because a part of every seed lot was kept separate with respect to mother tree, and important information about the mother tree was recorded by the seed collector. This type of correlation is of great value in forest tree breeding for an early evaluation of progeny from crosses. It is a big help, for example, to know whether or not growth rate or winter hardiness of small trees is related to that of one or both of the parents.

(4) Information concerning the existence or non-existence of races within the species will be of value to other geneticists and botanists. Applied research must be built upon basic information of this type.

Station IV

I. EXPERIMENTAL FARM WOODS

In 1946 the Department of Forest Research at the Ohio Agricultural Experiment Station initiated a program to establish one experimental forest in each county in the State. The major purpose of this project was to place at least one woodland in each county under a definite system of management with the objective of continuously producing the maximum of high quality timber of the species best suited to the sites involved. To date, 33 areas in 28 counties have been established. In all, permanent growth and mortality records are being kept on over 25,000 individual trees.

Each woodland is managed as a unit and management data are obtained from permanently established 1/5-acre circular plots on which each tree is individually numbered. Recurrent measurements of these plots at 5-year intervals provide continuous inventory growth and management data for individual trees.

During the summer of 1947, 39 fifth-acre sample plots were established in the 20-acre experimental woods just east of the Secrest Arboretum. At the time when the growth plots were put in, the woodland was divided into two compartments because of a difference in past treatment. Compartment A, 12 acres on the south side was heavily grazed until 1931. There is no indication of recent grazing in Compartment B, which includes the northern 8 acres of the area.

The fact that Compartment A was heavily grazed prior to 1931 is reflected in the wide gap in the diameter classes between seedlings and sawlogs.

Stocking in the 18 to 20-inch classes is quite satisfactory, but is far below the desired amount in the classes below 18 inches. Reproduction is chiefly dogwood and wild cherry, with elm, white oak, black walnut, and white ash occurring less frequently.

This is an experimental area devoted to the study of the rehabilitation of a previously unmanaged woodland. Important features involved are (1) the harvesting of mature timber and improvement of the stand by the removal of poor growing stock; (2) the study of the timber growth of our various native tree species --especially as related to the renovation of a stand of this type; and (3) the development of adequate reproduction of new trees in the portion which was formerly grazed.

Much of the overstory timber is near maturity or actually overmature. The first cut was made in 1947. Starting in the winter of 1951-52 the woods was put on an annual cut basis. The volume harvested from 1947 through the winter of 1952-53 totals over 21,000 board feet, or slightly over 1,000 board feet per acre. In addition at least 50 cull trees were removed from the stand. During this period growth has increased the stand from 5,600 board feet per acre to slightly over 6,000 board feet per acre.

Since much of the material which needs removal is of relatively poor quality, utilization is a particularly important consideration. Low grade sawlogs are better fitted for home use than sale, and practically all the timber harvested is used on the Station farms.

The woods is in a state of build-up and development. Its productivity will be built up by following the principles of sound timber cropping, namely:

Leaving trees whose growth is a good investment.

Harvesting trees whose present value exceeds their value for future growth.

Removing culls which will not pay their way.

Station V

K-29. MULTIFLORA ROSE

Multiflora rose has during recent years been highly recommended as a living fence. There are a number of questions which still need to be answered concerning the advantages and disadvantages of multiflora rose. For example, how many years will be required for such a fence to become an effective barrier to livestock? Will birds carry the seeds with the result that new plants will spring up in places where they are not wanted?

This fence was planted in the spring of 1949. Double furrows were plowed on approximately the 1,100 foot contour line in March, and in April 1,000 plants were spaced 12 inches apart, 750 were spaced 18 inches apart, some of which received manure with 20% phosphate, some with phosphate only, some with phosphate and nitrate of soda, and some with nitrate of soda only. Checks received no fertilizer.

In general, survival has been excellent, but there are still a few gaps where the fence is not stock proof. Roses planted under the canopy of trees have made very poor growth. There has been no perceptible growth response to phosphate fertilizer. There has been considerable spread of new plants to areas which are not intensively cultivated or mowed.

Station VI

J-7. LARGE BLACK WALNUT TREE

This walnut tree is estimated to be 125 years old. Please fill in the attached card. The winners in the two categories indicated at the bottom of the card will receive prizes at the beginning of the afternoon program.

Station VII

E-14. RED PINE AND NORWAY SPRUCE

This planting made on September 17, 1912 was started with 6-year transplants of red pine obtained from the Biltmore Nursery in North Carolina. The spruce 6-year transplants came from Lavasseur, France. Spacing was 6 x 6 feet in alternate row mixture. The two species have reached approximately the same height, although at the present time the pine appears to be forging ahead. Crop trees of red pine range from 8 to 10.5 inches in diameter, and 50 to 56 feet in height.

The spruce are 7 to 10 inches in diameter and 50 to 53 feet in height. Our Ohio latitude is a little far south for the growth of spruce in forest plantings except on very favorable sites.

This plot, along with several others, was thinned and intensive growth data taken in 1952. The comparative growth of several conifers in the Secrest Arboretum is shown in the following table which was prepared by J. A. Gibbs.

	No. Trees		Average DBH		Average Total Height		Cubic Feet		Age	Mean Annual Growth Cu. Ft.
	Before Thinning	After Thinning	Before Thinning	After Thinning	Before Thinning	After Thinning	Before	After		
Corsican pine	760	480	6.9	7.6	57	64	4767.20	3639.30	36	132.4
Austrian pine	572	268	8.0	8.8		56			37	
Red pine and) Norway spruce)	528	376	8.1	8.3	57	58	4472.60	3544.50	40	111.8
White pine	464	312	8.5	9.4	54	58	3896.67	3178.35	37	105.3
Red pine	600	400	7.2	7.7	53	55	3912.00	3144.00	40	98.0
European larch	476	328	8.1	8.8	52	54	3617.60	2893.00	44	82.2
White pine and) European larch)	472	276	7.6	8.6	54	57	3272.50	2349.50	41	80.0

Measurements taken in two hardwood plantings in 1952 present an interesting comparison. Plot E-12, tuliptree planted in 1909 at age 43 showed a mean annual growth of 79.5 cubic feet. Red oak in plot D-34 showed mean annual growth of 80.7 cubic feet per acre at age 37.

Station VIII

B-4. PLANTATION MANAGEMENT - CHRISTMAS TREE PRODUCTION

The present scope of Christmas tree production experiments at the Ohio Agricultural Experiment Station embodies four problems, (1) age of planting stock, (2) spacing, (3) mowing practices, (4) shearing practices.

Although considerable practical experience of Christmas tree planters along the above phases has brought to light many recommendations, these practices are relatively new developments and questions are poised frequently by planters desirous of producing the best trees and greatest return from their plantings.

Research with "Christmas" trees at the Ohio Agricultural Experiment Station is quite new and is being carried out in replicated plots at three points in Wayne County. At the Izaak Walton League Memorial Forest near Overton, 3.4 acres are planted with Riga strain Scotch pine; on the Robert Dush farm near Shreve 3.4 acres are planted with Norway spruce and in Compartment L of the Secrest Arboretum 1.8 acres are planted to red pine. These plots were established in 1952-53, using different age planting stock and various spacings, and have been mowed or left unmowed according to plan and will furnish material for shearing experiments in the near future.

At Station VIII in Compartment B of the Secrest Arboretum, a plot of Scotch pine is being used for exploratory shearing studies. Questions as to what time of year to shear, where to cut, and how much, and how often, are essential bits of information. The results of such exploratory shearing will serve to indicate possible research areas. This plot was established in 1950 with 4-year transplants and shearing was started in June of 1952.

Placards at each row and tags on some individual trees give details of further treatment accorded those trees. They show that rows 3, 6, and 8 were sheared in June 1952 and 1953, but not in 1954. Rows 2 and 4 were sheared in 1952 and again in 1954.

Many specific questions, such as, do stems continue to elongate after shearing, what number of buds or stems develop, and what are their characteristics when cut at different seasons, how much should be cut off, where do buds develop, can we cut into old woody growth and have buds develop, can a badly shaped tree be successfully altered, when should shearing be done for best results, can this time of shearing be changed to a season when labor is more available than spring, can we make a divided cut shearing only main leaders in spring and the remainder in winter, can shearing in the fall and winter be used for slowing growth to regulate flow of trees to market, must we shear each year, or on alternate years, or some other combination of shearings. Ramnifications of all these questions appear and some may lead to suitable research problems in the interest of labor saving practices and/or quality products in Christmas tree production.

Reference should be made to the following article:

Research In Christmas Tree Problems - J. A. Gibbs. Ohio Christmas Tree Growers Council, Bulletin No. 1, Feb. 1954.

Station IX

A-4. McKEE HYBRID POPLAR

This is strain F of a cross between southern cottonwood and western balsam. Ten-inch cuttings were made in May 1949. The first planting of this clone was established in Plot L-11 in 1947. Height growth in both plantings has been remarkable. An annual growth of as much as 6 feet has been measured on some of the trees, and the average height growth per acre since they were planted is over 5½ feet in the 1949 planting and 4 feet in the 1947 planting.

The 1947 planting averages 3.7 inches in diameter and the 1949, 3 inches in diameter. There are trees in the 1947 planting that are almost 6 inches in diameter. The table below presents a statistical summary of the measurements in these plantings that were made in January 1953 and the same measurements again in February 1954.

	Ave. Height		Max. Height		Ave. Diameter		Max. Diameter		% of 4 Trees with Cankers*	
Planted	Jan. 1953	Feb. 1954	Jan. 1953	Feb. 1954	Jan. 1953	Feb. 1954	Jan. 1953	Feb. 1954	Jan. 1953	Feb. 1954
1947	26	28	33	35	3.1	3.7	5.2	5.9	44	90
1949	22	28	27	33	2.5	3.0	3.9	5.1	0	11

*A fungus disease that attacks chiefly the main stem.

It is interesting to note that the 1949 planting is still maintaining very rapid height growth while the 1947 planting is definitely slowing down. The diameter measurements disclose that the rapid diameter growth in both plantings is continuing.

In the 1947 plantings the great increase in the number of cankers is very striking. There are some evidence of breakage of the main stems where cankers occurred in the upper part of the tree. The occurrence of cankers in the 1949 planting also shows a decided increase. It is apparent that both plantings are displaying a marked susceptibility to this canker disease. Considerable evidence of vigorous healing over of cankers was observed in both plantings.

Station X

POLE TURKEY SHELTER

This turkey shelter was built out of Station grown timber in 1952. Forty poles (10 banks of four poles each) were used as supports for the entire structure. Sixteen white pine poles obtained from the Secrest Arboretum were cold soaked with copper naphthenate and 24 untreated catalpa poles obtained from the plantation immediately east of the building were used in the building. One-half of the poles were 13.6 feet long with a 6-inch minimum top diameter. The other half were 17.6 feet long with 6-inch minimum top. Oak lumber for sheathing and siding were obtained from station woodlands.

A total of 568 man-hours consisting of one foreman, three carpenters and one laborer were used in the construction. The building is 126 feet long and 39 feet wide. Plans for this building are available at the Experiment Station. A larger pole building is in use at the Dairy farm for housing heifers. This building contains home grown white pine poles which were pressure treated with creosote at the Baker Wood Preserving Company in Marion.

Station XI

A-30. TAXUS
(A Living Herbarium of Yews)
Established in 1942

The species and varieties of the genus Taxus are highly prized for ornamental and landscape planting. There are numerous garden varieties of this genus. The principal species with which we are largely concerned are the English yew, Taxus baccata, the Japanese yew, Taxus cuspidata, and a cross between these two, Taxus media.

The English species and some of its varieties were introduced into this country in the latter part of the 1700's. It is not entirely hardy in Ohio, but some of its varieties withstand our winters with only occasional light burning of the foliage. The extreme low temperatures of the winter of 1935-36 injured and killed some of the varieties of the English species in the Experiment Station collection.

The Japanese and Media species and their varieties, on the other hand, are entirely hardy in our latitude and further north.

Some varieties are particularly well suited to foundation plantings around buildings, especially those of slower growing habit and desired form. Other varieties may be used for group plantings or individual specimens and for screens or shelter belts. They make excellent hedges.

The purpose of this collection is to show the variation in form of the many varieties available in nurseries and to eliminate the duplication of names resulting from the large number of varieties that have been developed. This collection is largely a contribution from members of the American Nurserymen's Association.